



# AAT8303 20V P-Channel Power MOSFET

## General Description

The AAT8303 is a low threshold P Channel MOSFET designed for the battery, cell phone, and PDA markets. Using AnalogicTech™'s proprietary ultra-high density Trench technology, and space saving small outline J-lead package, performance superior to that normally found in a larger footprint has been squeezed into the area of a TSOP6 package.

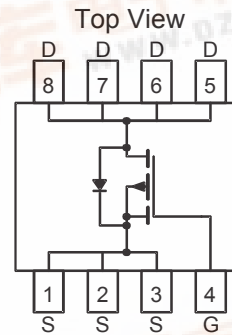
## Features

- $V_{DS(MAX)} = -20V$
- $I_{D(MAX)}^1 = -10A @ 25^{\circ}C$
- LOW  $R_{DS(ON)}$ :
  - $14\ m\Omega @ V_{GS} = -4.5V$
  - $24\ m\Omega @ V_{GS} = -2.5V$

## Applications

- Battery Packs
- Cellular & Cordless Telephones
- Battery-powered portable equipment
- Load Switches

## TSOPJW-8 Package



## Absolute Maximum Ratings ( $T_A=25^{\circ}C$ unless otherwise noted)

Symbol	Description	Value	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Continuous Drain Current @ $T_J=150^{\circ}C$ <sup>1</sup>	$T_A = 25^{\circ}C$	$\pm 10$
		$T_A = 70^{\circ}C$	$\pm 8$
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	$\pm 48$	A
$I_S$	Continuous Source Current (Source-Drain Diode) <sup>1</sup>	-2.3	A
$P_D$	Maximum Power Dissipation <sup>1</sup>	$T_A = 25^{\circ}C$	2.3
		$T_A = 70^{\circ}C$	1.5
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 to 150	$^{\circ}C$

## Thermal Characteristics

Symbol	Description	Typ	Max	Units
$R_{\theta JA}$	Junction-to-Ambient steady state <sup>1</sup>	86	105	$^{\circ}C/W$
$R_{\theta JA2}$	Junction-to-Ambient $t < 5$ seconds <sup>1</sup>	44	54	$^{\circ}C/W$
$R_{\theta JF}$	Junction-to-Foot <sup>1</sup>	27	32	$^{\circ}C/W$

Preliminary Information



### Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Symbol	Description	Conditions	Min	Typ	Max	Units
<b>DC Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-20			V
R <sub>DS(ON)</sub>	Drain-Source ON-Resistance <sup>2</sup>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A		11	14	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-7.6A		18	24	
I <sub>D(ON)</sub>	On-State Drain Current <sup>2</sup>	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-5V (Pulsed)	-48			A
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250μA	-0.6			V
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V			±100	nA
I <sub>DSS</sub>	Drain Source Leakage Current	V <sub>GS</sub> =0V, V <sub>DS</sub> =-20V			-1	μA
		V <sub>GS</sub> =0V, V <sub>DS</sub> =-16V, T <sub>J</sub> =70°C <sup>3</sup>			-5	
g <sub>fs</sub>	Forward Transconductance <sup>2</sup>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-10A		31		S
<b>Dynamic Characteristics <sup>3</sup></b>						
Q <sub>G</sub>	Total Gate Charge	V <sub>DS</sub> =-10V, R <sub>D</sub> =1.0Ω, V <sub>GS</sub> =-4.5V		36		nC
Q <sub>GS</sub>	Gate-Source Charge	V <sub>DS</sub> =-10V, R <sub>D</sub> =1.0Ω, V <sub>GS</sub> =-4.5V		5		
Q <sub>GD</sub>	Gate-Drain Charge	V <sub>DS</sub> =-10V, R <sub>D</sub> =1.0Ω, V <sub>GS</sub> =-4.5V		13		
t <sub>D(ON)</sub>	Turn-ON Delay	V <sub>DS</sub> =-10V, V <sub>GS</sub> =-4.5V, R <sub>D</sub> =1.0Ω, R <sub>G</sub> =6Ω		10		ns
t <sub>R</sub>	Turn-ON Rise Time	V <sub>DS</sub> =-10V, V <sub>GS</sub> =-4.5V, R <sub>D</sub> =1.0Ω, R <sub>G</sub> =6Ω		72		
t <sub>D(OFF)</sub>	Turn-OFF Delay	V <sub>DS</sub> =-10V, V <sub>GS</sub> =-4.5V, R <sub>D</sub> =1.0Ω, R <sub>G</sub> =6Ω		78		
t <sub>F</sub>	Turn-OFF Fall Time	V <sub>DS</sub> =-10V, V <sub>GS</sub> =-4.5V, R <sub>D</sub> =1.0Ω, R <sub>G</sub> =6Ω		108		
<b>Source-Drain Diode Characteristics</b>						
V <sub>SD</sub>	Source-Drain Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0, I <sub>S</sub> =-10A			-1.1	V
I <sub>S</sub>	Continuous Diode Current <sup>1</sup>				-2.3	A

Note 1: Based on thermal dissipation from junction to ambient while mounted on a 1" x 1" PCB with optimized layout. A 5 second pulse on a 1" x 1" PCB approximates testing a device mounted on a large multi-layer PCB as in most applications. R<sub>θJF</sub> + R<sub>θFA</sub> = R<sub>θJA</sub> where the foot thermal reference is defined as the normal solder mounting surface of the device's leads. R<sub>θJF</sub> is guaranteed by design, however R<sub>θCA</sub> is determined by the PCB design. Actual maximum continuous current is limited by the application's design.

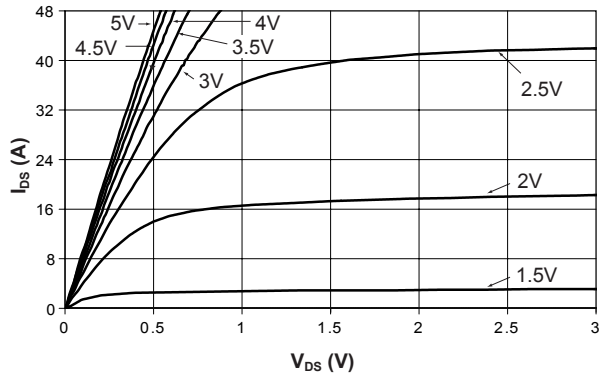
Note 2: Pulse test: Pulse Width = 300 μs

Note 3: Guaranteed by design. Not subject to production testing.

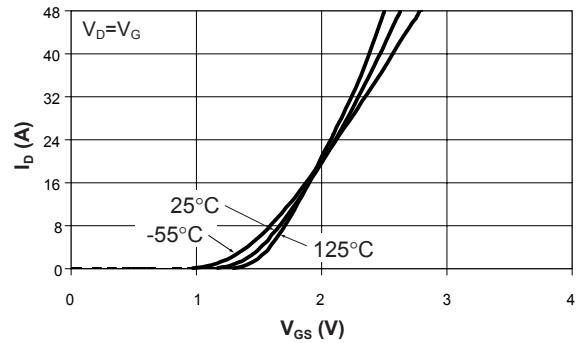
## Typical Characteristics

( $T_J = 25^\circ\text{C}$  unless otherwise noted)

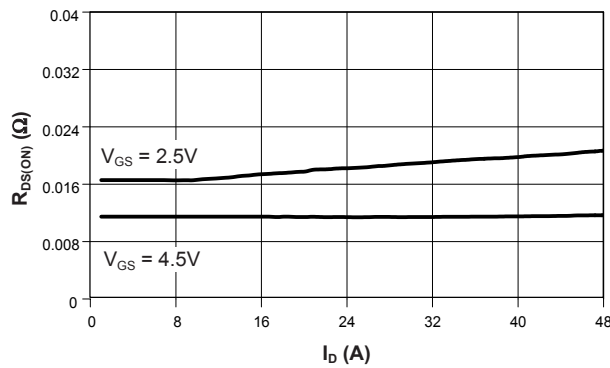
### Output Characteristics



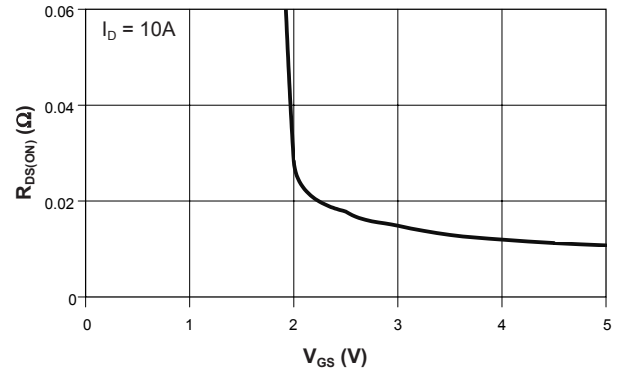
### Transfer Characteristics



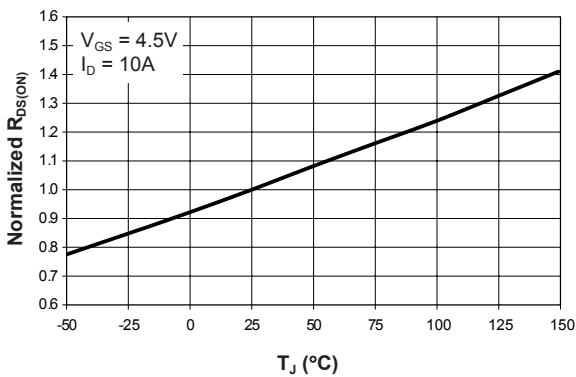
### On-Resistance vs. Drain Current



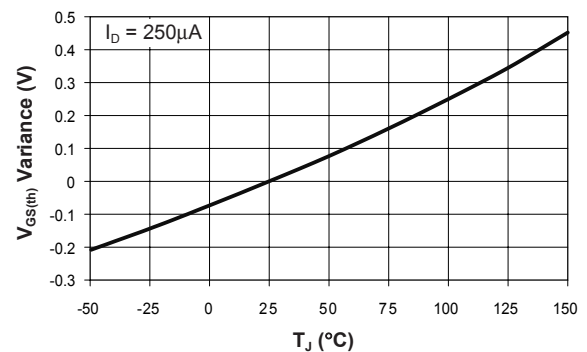
### On-Resistance vs. Gate to Source Voltage



### On-Resistance vs. Junction Temperature



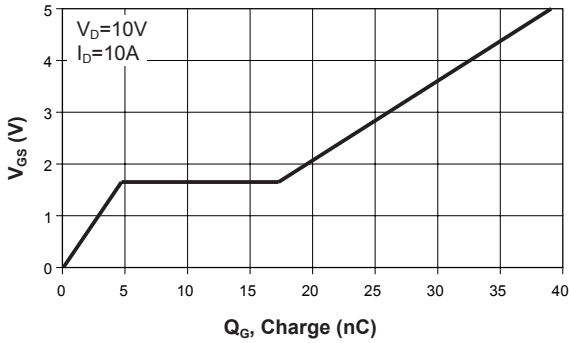
### Threshold Voltage



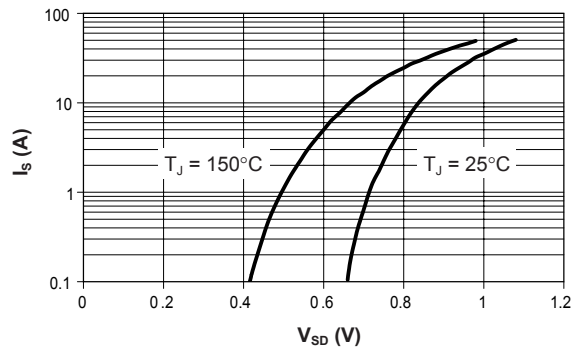
### Typical Characteristics

( $T_J = 25^\circ\text{C}$  unless otherwise noted)

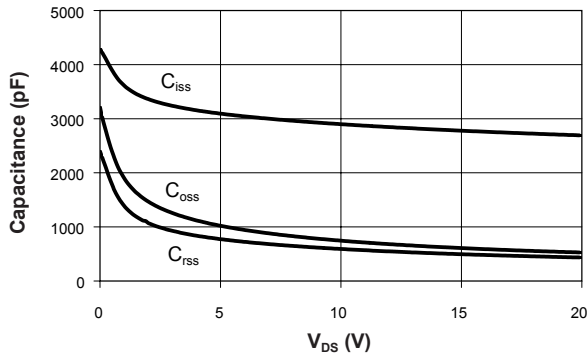
**Gate Charge**



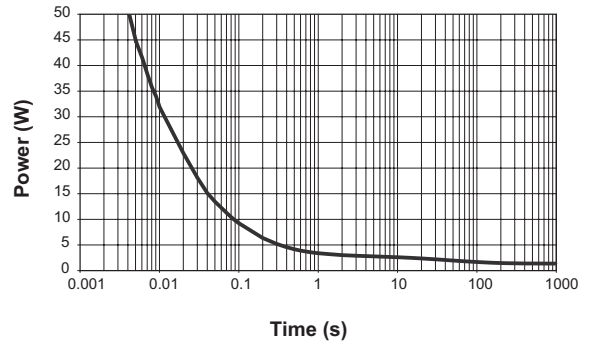
**Source-Drain Diode Forward Voltage**



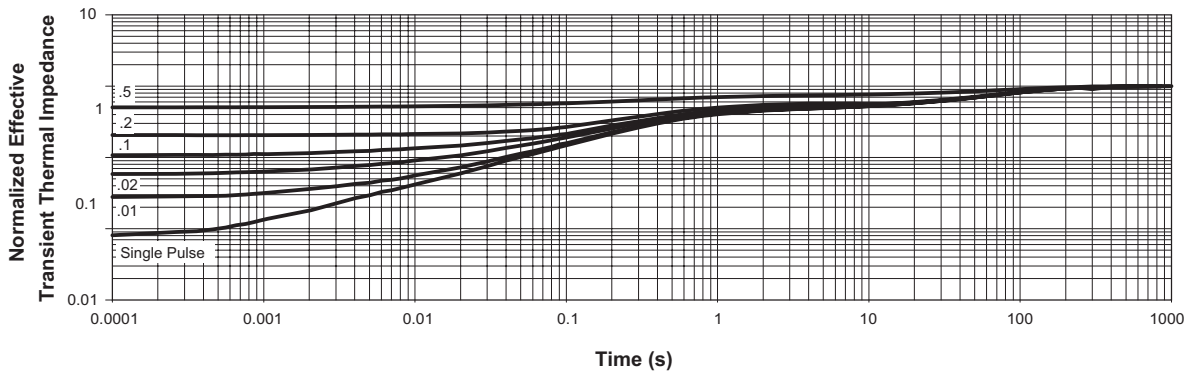
**Capacitance**



**Single Pulse Power, Junction to Ambient**



**Transient Thermal Response, Junction to Ambient**



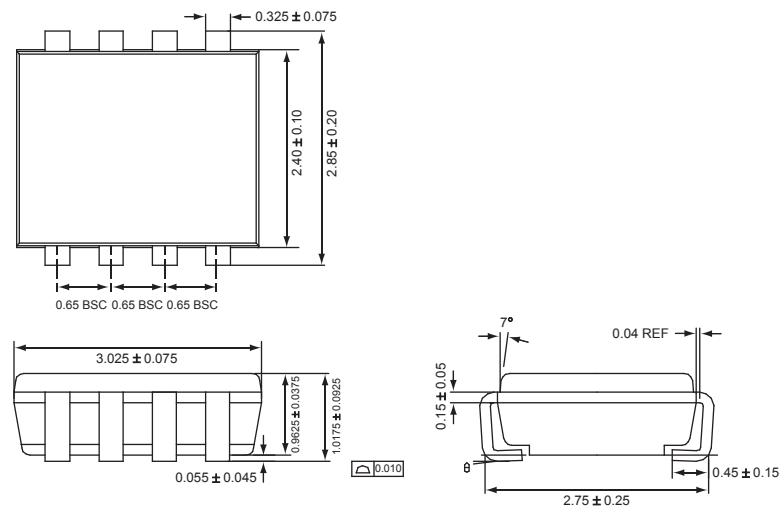
### Ordering Information

Package	Marking <sup>1</sup>	Part Number (Tape and Reel)
TSOPJW-8	JXXYY	AAT8303ITS-T1

Note 1: XYY = assembly and date code.

### Package Information

#### TSOPJW-8



All dimensions in millimeters.

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